The Olentangy River Wetland Research Park:

Progress Report for 2002

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Summary

This publication offers the eleventh consecutive annual report on teaching, research, service, and development at the Olentangy River Wetland Research Park (ORWRP). It covers progress in calendar year 2002, the ninth year of hydrologic operation of the two 2.5-acre experimental wetland "kidneys" on the site, the sixth year of ecological development of our 7-acre mitigation wetland "billabong," the fourth year of the Sandefur Wetland Pavilion, and, probably most important, the year of construction of the Heffner Wetland Research and Education Building.

Over twenty courses from 5 Colleges (FAES, MAPS, ENG, BIOSCI, Humanities) and several other Ohio universities used the ORWRP in 2002. Two master's theses were completed in 2002, raising the total number of theses and dissertations completed at the ORWRP to 40. A short course on river restoration was taught in 2002 to 12 participants from 8 states/provinces. One hundred and eighteen tours or presentations of the ORWRP were given in 2002 to over 1600 participants.

Grants and contracts totalling $1.94 million were active at the ORWRP in 2002. Approximately $365,000 in donations were secured in 2002, well above the $250,000 in donations generated in 2001. These donations included several in-kind contributions for the wetland building construction. The most significant event related to ORWRP in 2002 was the construction of the $2.5 million Wetland Research and Education Building at the ORWRP.

The economic impact of the ORWRP to The Ohio State University over its 12-year history has been $4.6 million.

Why a Wetland Research Park?

Wetlands are shallow to intermittently flooded ecosystems that are more commonly known by such terms as swamps, bogs, marshes, and sedge meadows. They are revered as important parts of the natural landscape because of their functions in cleaning and retaining water naturally and in providing a habitat and food source for a wide variety of plant and animal species. It is estimated that more than half of the original wetlands in the lower 48 states have been lost to drainage projects and human development projects. Ohio has lost about 90 percent of its original wetlands.

When we lose wetlands, we lose their ability to provide clean water, prevent floods, and enhance biological diversity. Many organizations are calling for construction of new wetlands to clean up our streams, rivers, and lakes. The National Academy of Sciences has called for the restoration and creation of 10 million acres of wetlands in the United States by the year 2010. Five million acres of wetlands in the Mississippi River Basin have been suggested as being necessary to help prevent the dead zone, or hypoxia, in the Gulf of Mexico (Mitsch et al., 2001). The U.S. Army Corps of Engineers oversees a regulatory program that results in tens of thousands of acres of wetlands being restored and created each year to replace wetlands that are lost to development. Futhermore, the largest wetland and riverine restorations in the world, at costs that will exceed $20 billion, are underway or planned for the Everglades and Louisiana Delta. But a National Academy of Sciences panel (NRC, 2001) determined that much more research is needed before we can be assured that mitigation wetlands, those wetlands that are constructed to replace wetlands destroyed for development, can be successful. In order to solve such problems we need to know: 1) how wetlands work; 2) if we can create and restore them; and 3) the best approaches to creation and restoration of wetlands. The Olentangy River Wetland Research Park is designed to be a long-term, large-scale wetland research facility on a major college campus. There is no other facility of its kind on any other campus in the USA.

Progress at OSU's Wetland Site

The Olentangy River Wetland Research Park is located on a 30-acre site owned by the Ohio State University, immediately north of Dodridge Road and adjacent to the Columbus campus (Figures 1 and 2). The site has been developed in three phases:

Phase 1 — Construction of two experimental wetland basins and their water delivery system;

Phase 2—Development of a research and teaching infrastructure at the site including boardwalks, experimental mesocosms, a plant-material greenhouse, additional wetlands, instrumentation for long-term research, and a visitor pavilion; and

Phase 3—Development and construction of a the Wetland Research and Education Building on the site.

Phase 1 of site development, which featured construction of two 2.5-acre deepwater marshes and a river water delivery system, was completed in 1994. Pumps were installed on the floodplain to bring water from the Olentangy River to

Figure 1. Aerial photograph of Olentangy River Wetland Research Park, Ohio State University, August 2002.

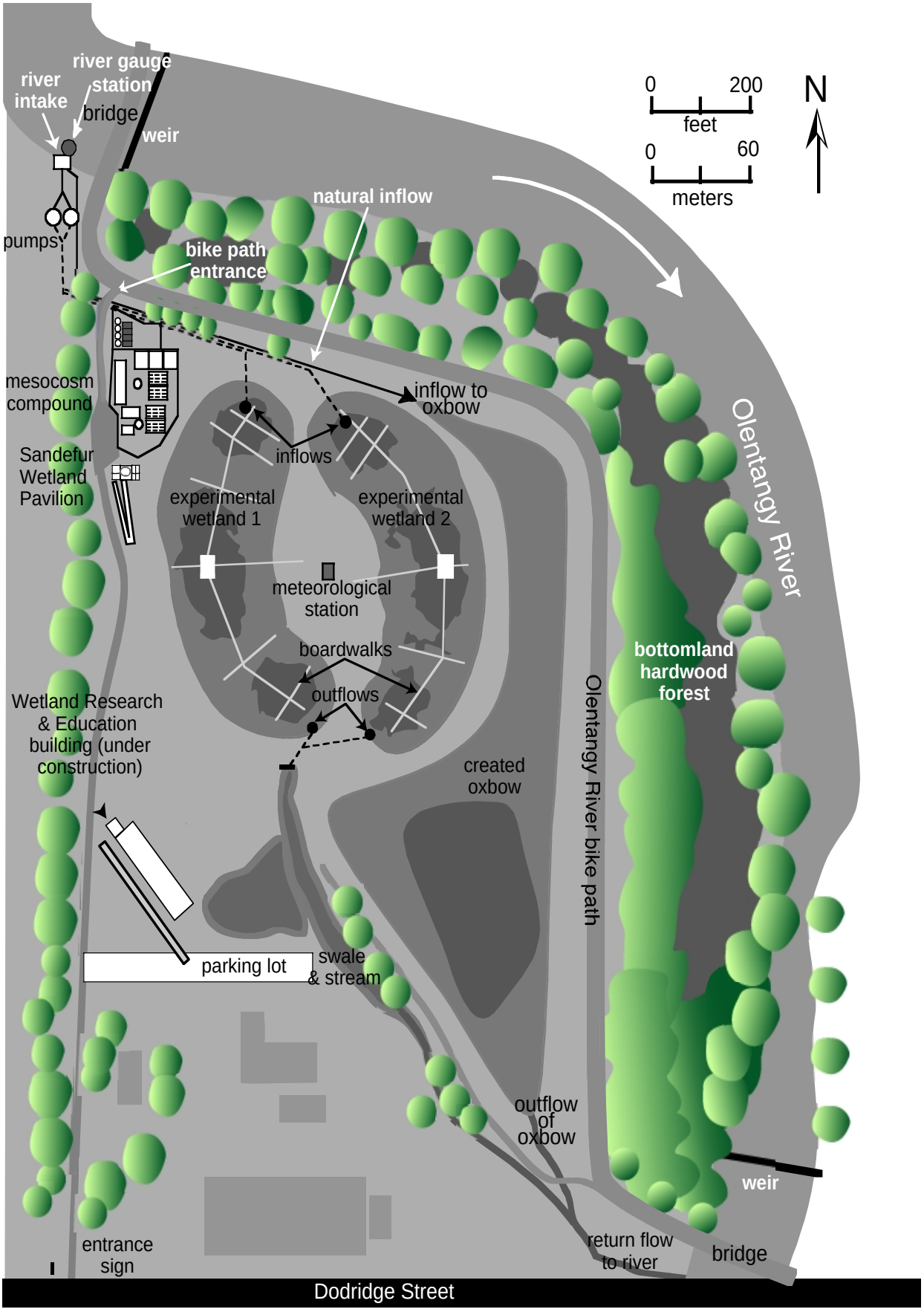

Figure 2. Status of of the Olentangy River Wetland Research Park at the end of 2002.

the wetlands and pumping officially began on March 4, 1994. River water is pumped continuously, day and night, into the two wetlands. It then flows by gravity back to the Olentangy River through a swale and constructed stream system. In May 1994, one wetland basin was planted with marsh vegetation typical of wetlands in the Midwest; the other remained as an unplanted control.

Phase 2, establishing the infrastructure for research and education of the site, began in 1994 and was completed with the dedication of the Sandefur Wetland Pavilion in 1999.

Phase 3, the construction of the $2.8 million Wetland Research and Education Building at the ORWRP, began in earnest with the receipt of $1.18 million in 2 grants from the Ohio Board of Regents in 1999 and 2000 in their Hayes Investment Fund competition. The grants were the result of an effort of a 5-university consortium of Ohio institutions—Ohio State, Wright State, Shawnee State, Youngstown State, and Kenyon College. Additional support for the building continued through 2001 and the decision to go forward with building construction was made on December 13, 2001. Construction began in spring 2002 and was mostly completed except for some interior work by January 2003. Staff and students moved into the building on March 6, 2003.

Teaching, Research, and Service

Teaching

On-site teaching in a "living laboratory" setting has been an emphasis at the Olentangy River Wetland Research Park since its inception. From the time that a Natural Resources graduate seminar class in 1991 helped to design the project, dozens of formal courses involving thousands of students have used the site annually for ecological or other learning related to wetlands, surrounding uplands or the river. These formal courses have included classes on wetland ecology, water quality, ecological engineering, anthropology, architecture, general chemistry, wildlife management, animal ecology, groundwater hydrology, ornithology, and forestry. Twenty courses involving several hundred students formally used the site in 2002 (Table 1). In addition, the site is used annually for hundreds of hours of undergraduate and graduate research credit hours, e.g., 693 or 999. Classes from several Ohio colleges, including Columbus State, Capital University, and Denison University, used the wetlands for field trips in 2002.

A total of 40 students have completed dissertations, master's theses, or honors undergraduate theses with partial

Table 1. Formal class use of Olentangy River Wetland Research Park, 2002.

Term	Course	Number of Students	Instructor
Winter 2002	NR 355 Water Quality Management	30	Bouchard
	EEOB Mammalogy	10	Harder
	General Biology, Columbus State/OSU	20	Mort Jaudi
	NR 567 Communication Environmental & Natural Resources Information	10	
	NR/CE/FABE 618 Ecological Engineering Science	35	Bouchard, Martin, Granata
Spring 2002			
	NR 355 Water Quality Management	30	Cronk
	LARCH 622 Landscape Architecture	7	Brooks Breeden
	EEOB 322 Introduction to Ornithology	20	
	LARCH 323 Landscape Architecture	10	Brooks Breeden
	History OSU-Its History and Its World	20	Dick Sisson
	EEOB 210 Native Flora	35	Liz Harris
Summer 2002	ES/NR 999 Independent Research	3	Mitsch
	EEOB 210 Native Flora	27	Liz Harris
Autumn 2002	Introduction to Biology – Columbus State	20	Mort Jaudi
	Ecology - Capital University	17	
	Ent 641 Insect Ecology	10	Dave J. Horn
	EEOB Mammalogy	70	John D. Harder
	EMSI 221 Honors Chemistry	20	Susan Olesik
	NR 725 Wetland Ecology and Management	30	Mitsch
	Ecology - Denison University	20	Spieles
	EEOB 661 Conservation Biology	30	John D. Harder
	ES/NR 999 Independent Research	3	Mitsch

Table 2. Theses and dissertations completed at the Olentangy River Wetland Research Park through 2002.

Ph.D. dissertations (10)

- **Changwoo Ahn** "Ecological engineering of wetlands with a recycled coal combustion byprooduct" Ph.D. dissertation, Environmental Science Graduate Program (2001)
- **John J. Gutrich** "Ecological and economic analysis of natural capital: Assessing and modeling the substitutability of mitigation wetlands for natural sites" Ph.D. dissertation, Department of Agricultural, Environmental, and Developmental Economics (2000)
- **Michael A. Liptak** "Water column productivity, calcite precipitation, and phosphorus dynamics in freshwater marshes" Environmental Science Graduate Program (2000)
- **John J. Gutrich** "Ecological and economic analysis of natural capital: Assessing and modeling the substitutability of mitigation wetlands for natural sites" Environmental Science Graduate Program (2000)
- **Douglas J. Spieles** "Nutrient retention and macroinvertebrate community structure in constructed wetlands receiving wastewater and river water" Environmental Science Graduate Program (1998)
- **Randall J.F. Bruins** "Modeling of flooding response and ecological engineering in an agricultural wetland region of Central China" Environmental Science Graduate Program (1997)
- **Neal E. Flanagan** "Comparing ecosystem structure and function of constructed and naturally occurring wetlands: Empirical field indicators and theoretical indices" Environmental Science Graduate Program (1997)
- **Robert W. Nairn** "Biogeochemistry of newly created riparian wetlands: evaluation of water quality changes and soil development" Environmental Science Graduate Program (1996)
- **Naiming Wang** "Modelling phosphorus retention in freshwater wetlands" Environmental Science Program (1996)
- **Paul E. Weihe** "Colonizing and introduced vegetation in created riparian wetlands: Establishment during the first two growing seasons" Environmental Science Graduate Program (1996)

Master's theses (15)

- **Cheri Higgins** "Ecosystem engineering by muskrats (*Ondatra zibethicus)* in created freshwater marshes" Environmental Science Graduate Program (2002)
- **Amie M. Gifford** "The effect of macrophyte planting on amphibian and fish community use of two created wetland ecosystems in central Ohio" Environmental Science Graduate Program (2002)
- **Daniel F. Fink** "Efficacy of a newly created wetland at reducing nutrient loads from agricultural runoff" Environmental Science Graduate Program (2001)
- **Matthew Cochran** "Effect of hydrology on bottomland hardwood forest productivity in central Ohio (USA)" Natural Resources (2001)
- **Sarah K. Harter** "Patterns of short-term sedimentation in a freshwater created marsh" Natural Resources (1999)
- **Sharon A. Johnson** "Effects of hydrology and plant introduction on first-year macrophyte growth in a newly created wetland" Natural Resources (1998)
- **Lisa J. Svengsouk** "First-year response of *Typha latifolia* L. and *Schoenoplectus tabernaemontani* (K.C. Gmel.) Palla to nitrogen and phosphorus additions in experimental mesocosms" Environmental Science Graduate Program (1998)
- **Kathleen D. Metzger** "Self-design of a fish community in a created riparian freshwater marsh: A simulation model" Environmental Science Graduate Program (1997)
- **John S. Koreny** "Hydrology of a constructed riparian wetland system: Characterization and predictive modeling" Environmental Science Graduate Program (1996)
- **Uygar Özesmi** "A spatial habitat model for the marsh-breeding red-wing blackbird (*Agelaius phoeniceus*) in coastal Lake Erie wetlands" Environmental Science Graduate Program (1996)
- **Doreen M. Dudek** "Tree growth responses to streamflow in a bottomland forest in central Ohio" Natural Resources (1995)
- **Steven F. Niswander** "Functional analysis of a created in-stream mitigation wetland: hydrology, phosphorus retention, and tree growth" Natural Resources (1994)
- **Renée F. Wilson** "Progress and success of five mitigation wetlands in Ohio" Natural Resources (1995)
- **Karen M. Wise** "Evaluation of acid mine drainage control by a constructed wetland in southeastern Ohio" Natural Resources (1994)
- **Frank D. Voss** "Groundwater investigation of Ohio State University wetland site" Geodetic Science (1993)

Undergraduate honors theses (10)

- **Katherine E. Kleber** "Fish population and movement within planted and naturally colonizing experimental wetlands, autumn 2000" Natural Resources (2000)
- **Erika A. Filippi** "The role of soil organic matter on denitrification potential in newly created wetlands" Natural Resources (1998)
- **Bonnie F. Elfritz** "A comparison of natural wetlands with a constructed wetland using the Floristic Quality Assessment Index" Natural Resources (1998)

- **Kimberly K. Schamp** "Groundwater patterns before and after wetland construction at the Olentangy River Wetland Research Park" Natural Resources (1997)
- **Nicole L. Vorwerk** "Comparison of three years of pH values between planted and unplanted wetlands at the Olentangy River Wetland Research Park" Natural Resources (1997)
- **Rainie D. Gardner** "Fish recruitment in the Olentangy River constructed wetlands" Natural Resources (1997)
- **Tonya Cheek** "Effect of fish on wetland water quality" Natural Resources (1996)
- **Andrew W. Wehr** "Early water quality of created wetlands at the Olentangy River Wetland Research Park" NaturalResources (1995)
- **Michael E. Berkal** "Hydrology and water chemistry of the Olentangy River in Worthington (Franklin County), Ohio, and their potential effects on a future constructed wetlands facility downstream in Columbus, Ohio" Natural Resources (1992)
- **Douglas G. Stuart** "Intensive water quality sampling in two constructed riparian wetlands" Natural Resources (1992)

Theses at other universities (5)

- **Rikki Bronnum** "The effects of alachlor on denitrifying bacteria in mesocosms and created wetlands in central Ohio, USA" Master's Thesis, Environmental Chemistry, University of Copenhagen (2001)
- **Hojeong Kang** "The significance of enzyme activities in wetland biogeochemistry" University of Wales, UK (1999)
- **Pernille Mortensen** and **Pernille Lanzky** "Water quality improvement in a constructed wetland" Thesis, Royal Danish School of Pharmacy, Copenhagen, DENMARK (1996)
- **Rebecca Smith** "Nitrogen transfer in groundwater in the riparian zone of the Olentangy River, Columbus, Ohio" Thesis, Cambridge University, Cambridge, England, UK (1996)

Table 3. Funded research projects active at the Olentangy River Wetland Research Park in 2002.

RF #	Short title	Funding Source	College	Amount	end date
733487	A mitigation wetland	Pine Grove, Inc.	FAES	$54,000	8/31/02
738587	Wetland monitoring and management	Ohio Dept of Transportation	FAES	$75,000	5/4/06
738869	Reuse of clean coal FGD material	Ohio Dept of Development	ENG	$544,000	10/31/03
739039	Reuse of clean coal FGD material (suppl.)	West Virginia University	ENG	$25,000	8/31/03
	Hayes Investment Fund	Ohio Board of Regents	Research	$1,180,000	12/31/03
741196	Pre-restoration studies of Upper Big Darby	U.S. Army Corps of Eng.	FAES	$68,000	9/30/02
	TOTAL			$1,946,000	

or full use of the Olentangy River Wetland Research Park from 1992 through 2002 (Table 2). Two master's theses were completed in 2002. While most students are from Ohio State departments, there have been 5 students from Europe (two from UK, three from Denmark) who collected thesis data at the ORWRP. Dozens of organizations in addition to Ohio State have collected data or conducted research at the ORWRP.

Research

Since the wetland project began in 1992 and especially since the two 1-ha basins were flooded on March 4, 1994, dozens of research projects have been initiated by graduate and undergraduate students and post-docs from Ohio State University and elsewhere. Results of those research projects are presented in annual reports.

Over $1.9 million in contracts and grants were active at the ORWRP in 2002 (Table 3). It is unlikely that any of this funding would have been awarded if the ORWRP was not present at Ohio State University. The projects included FGD coal combustion product recycling project (Ohio Department of Development, Bill Wolfe, PI), bottomland hardwood forest restoration (Ohio Department of Transportation, Mitsch, PI), and Big Darby Creek restoration (U.S. Army Corps of Engineers, Mitsch and Li, PI's). Two grants totalling $1,118,000 from the Ohio Board of Regents for the Wetland Research and Education Building at the Olentangy River Wetland Research Park were also being actively spent in 2002.

Public Outreach

The ORWRP had several significant public activities in 2002. On May 3, 2002, an event referred to as "Wetland Day" was held at the ORWRP for the general public. Over 200 volunteers came to the Olentangy River Wetland Research Park to remove invasive plant species from our forested wetlands, clean up trash, plant wetland plants in the greenhouse and wetlands, and tour the wetlands and new building construction (Figure 3).

An ORWRP tradition, the Moonlight on the Marsh Distinguished Lecture, was held at the ORWRP Sandefur Pavilion on Monday evening, August 12, 2002 (Figure 4).

Figure 3. Wetland Day, a special volunteer day held at the Olentangy River Wetland Research Park on May 3, 2002.

Dr. Edwin E. Herricks, Professor of Environmental Biology in the Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, spoke on "River Restoration—Another Oxymoron or a Real Hope for Watershed Management." Dr. Herricks received a B.A. in biology and English from the University of Kansas; an M.S. in engineering from The Johns Hopkins University; and a Ph.D. in biology from the Virginia Polytechnic Institute and State University. His areas of expertise include aquatic ecology, biomonitoring, and stream ecosystem management. He has authored or co-authored three books and over 125 articles and reports and has participated in education/management programs in United Kingdom, Yugoslavia, France, Germany, Japan, and Taiwan. The event was attended by 80 participants. As has become the custom, a "Picnic at the Swamp" was held prior to the seminar and a tour of the wetlands was also given to those who were interested.

In collaboration with the local environmental group FLOW (Friends of Lower Olentangy Watershed), OSU student volunteers, especially newly arriving freshmen, volunteered to help harvest and remove the invasive shrub Amur honeysuckle (*Lonicera maackii*) from the bottomland hardwood forest at the ORWRP as part of its restoration. Approximately 30 students and FLOW volunteers participated at the September 24, 2002 event. Ohio Department of Transportation provided the chipper to grind up the woody material and deposit it on "honeysuckle way"—the wood chip path around the experimental wetlands.

The ORWRP also hosted two "hard hat" events in 2002 as the wetland building neared completion. On Friday, October 11, the first event was held and was attended by about 50 participants. Tours were given of the unfinished building and the wetlands. On Friday, November 22, 2002, a scientific event was held during OSU-Michigan week entitled "Restoring the Louisiana Delta and the Mississipi River Basin" (Figure 5). Presentations were given by Hans van Winkle, Deputy Commander of the U.S. Army Corps of Engineers; John Day, Professor of Coastal Ecology, Louisiana State University; Bill Mitsch, Director and Professor ORWRP; Rattan Lal, Professor, Natural Resources; Bill Wolfe, Professor, Civil and Environmental Engineering; and Frank Schwartz, Geological Sciences.

Tours and Presentations

Formal tours and presentations of the ORWRP continued to be among our more popular public service contributions in 2002 (Figure 6). The ORWRP conducted 118 tours or public presentations on the Olentangy River Wetland Research Park in 2002 to over 1600 participants (Table 4). Groups receiving tours ranged from Wyandotte Elementary to Columbus State. Families (Figure 7), church groups, and agency representatives were among those taking tours.

There were several distinguished visitors to the wetlands in 2002. An important visitor was Nobel Prize-winning scientist Rowland F. Sherwood, who visited the ORWRP with his wife Joan on June 12 (Figure 8) . Other distinguished visitors to the welands in 2002 included Major General Hans Van Winkle, Deputy Commander, U.S. Army Corps of Engineers, Washington DC; Father Theodore Hesburgh, President Emeritus of University of Notre Dame; and professors from University of Maryland, Louisiana State University, University of Oklahoma, and University of Illinois.

Publications

There were 5 peer-reviewed papers, 2 technical reports, and 2 theses/dissertations added to the ORWRP reprint collection in 2002 (Table 5).

Short Courses

One short course was taught in 2002 in the wetland program—*Ecological Engineering and Restoration of Rivers* on August 12-14, 2002 at the Fairfield Inn near the ORWRP by Ed Herricks, University of Illinois, and Bill Mitsch and Andy Ward, Ohio State University. The course attracted 12 students from 8 states/provinces: FL, IN, KY, MA, MI, OH, Virgin Islands, and Ontario, Canada (Figure 9). Revenue for the short course was approximately $9,000 in FY 2002.

Publicity

The Olentangy River Wetland Research Park was publicized 6 times during 2002 in newspaper articles and other publications (Table 6). Copies of articles published on the site or our wetland research in 2002 are given in the Appendix.

Development

The Olentangy River Wetland Research Park has been supported in its twelve years (1991-2002) principally through private donations to the University. Through December 2002, the equivalent of over $1,840,000 has been raised for the wetland project (Table 7; Figure 10), almost all from corporations and individuals. In 2002, there were 264 identifiable donations totalling $365,000, an increase from $248,000 raised in 2001. In 2002, most of the donations were for the Wetland Research and Education Building.

About 28% of the donations received since 1992 have been as in-kind contributions. Major in-kind gifts to the University in 2002 obtained by the ORWRP were for ground work and building materials supplied for the wetland building construction. Other in-kind support obtained over the 12 years includes donation of 4.9 acres of land on the southeastern corner of the ORWRP adjacent to river (value of $75,000), two four-wheel drive vehicles, and construction of the billabong wetland.

Research and Education Building

The Wetland Research and Education Building (Figure 11) is now complete (as of early 2003). The building allows

Figure 4. ORW Advisory Committee Chair Jerry Pausch presents Moonlight on the Marsh Lecturer plaque to Ed Herricks, Professor of Environmental Biology, University of Illinois, August 12, 2002 at Sandefur Wetland Pavilion

Please join us in Michigan Week for another "hard hat" event at the wetlands
Sponsored by Office of Research and Olentangy River Wetland Research Park

RESTORING THE LOUISIANA DELTA AND THE MISSISSIPPI RIVER BASIN
(Don't worry, Michigan is not in the Mississippi River Basin)

Friday, November 22, 2002, 3-5 PM
Olentangy River Wetland Research & Education Building
352 Dodridge Street, The Ohio State University

3:00 - 3:30 pm General Hans van Winkle, Deputy Commander of the U.S. Army Corps of Engineers, Washington DC *Coast 2050: The Restoration of the Mississippi River Delta*

3:30 - 4:00! Research Vignettes
Professor John Day, Louisiana State University
Louisiana Restoration - Need for Connection to Basin

Professor Bill Mitsch, School of Natural Resources, OSU
Restoring Mississippi/Missouri/Ohio Basins (MOM) with Wetlands

Professor Rattan Lal, School of Natural Resources, OSU
OSU Wetlands and Climate Change

Professor Bill Wolfe, Civil and Environmental Engineering and Geodetic Science, OSU
Recycling Coal Combustion Products

Professor Frank Schwartz, Geological Sciences, OSU
Groundwater/Watershed Research

4:00 - 4:20 Discussion
4:20 - 5:00 Wine and Cheese

For more info call 292-9774 /Email: mitsch.1@osu.edu

Figure 5. Announcement of Nov 22, 2002 "hardhat" symposium held in unfinished wetland building

Figure 6. Over 100 tours were given at the Olentangy River Wetland Research Park in 2002. Shown here is a class organized by Shawnee State University of Appalachian-region students from Ohio, Kentucky, and West Virginia, June 21, 2002

Table 4. Tours and presentations of the Olentangy River Wetland Research Park in 2002

Date	note	Organization	Est. #
11/17/02	*	Nancy Dent	1
1/18/02	*	ORW Advisory Committee	5
1/26/02		ORW Consortium meeting - OSU	9
1/28/02		Helix - Biology Honorary Society	40
1/29/02	*	Kurt Simmons	1
1/30/02	*	Ariana Sutton, prospective student, ESGP	1
2/7/02	*	Karla Peery and mother	4
2/8/02	*	Hypoxia task force	7
2/11/02	**	Cynthia Kolar, Fisheries position candidate	1
2/12/02	*	4-H students	9
2/18/02	**	Lisa Eby, Fisheries position candidate	2
2/26/02	*	NR 618 Eco Eng Virginie Bouchard	35
2/26/02	**	Ken Ostrand, Fisheries position candidate	2
2/28/02	**	Lance Williams, Fisheries position candidate	3
3/6/02	**	Mary Knapp, US Fish and Wildlife Service	3
3/15/02	*	Sarah Mc Millan, prospective student, Civil and Environmental Eng	1
3/15/02	*	Mort Jauadi, Columbus State	20
3/22/02	**	Theodore M. Hesburgh, CSC, Dr. and Mrs. Dick Sexton, Univ of Notre Dame	3
3/22/02	*	John Stevenson	3
4/5/02	*	Ohio Dept Natural Resources-Env Education Council	40
4/7/02	*	Ohio Academy of Science-Gary McKenzie	10
4/18/02	**	Changwoo Ahn, University of Illinois	3
4/19/02	*	American Language Program, Julie Taffe	11
4/19/02	*	4th grade Girl Scouts - Teresa Schoff	23
4/22/02	*	EEOB 210 Native Vegetation (Liz Harris)	20
4/23/02	*	EEOB 210 Native Vegetation (Liz Harris)	15
4/23/03	*	NR 622 - Bob Gates	35
4/23/02	*	Landscale Architecture 323/622	20
4/24/02	*	Upper Arlington High School	25
4/24/02	*	Upper Arlington High School	30
4/25/02	*	Take a Daughter to Work--15 young girls (+ Samantha Romanello)	17
4/26/02		ORW advisory committee	15
4/26/02	*	Mark Delling-prospective student	1
4/27/02	*	The Nature Conservancy	25
5/2/02		OSU-Its History and Its World--classroom presentation	20
5/3/02	*	Wetland Day Event-St Agatha, UAHS, OSU classes	150
5/6/02	**	Prof. Jayanta Bhattacharya, Indian Institute of Technology	1
5/7/02	**	Carlos Hernandez, EARTH University, Costa Rica	2
5/21/02	*	Lora Bechwith, Home School	8
5/24/02	*	Wyandotte Run Elementary	60
5/29/02	*	Todd Starker - 12 pre-school	12
6/3/02		Senator DeWine and Senator Voinivich staffers, Washington, DC	5
6/5/02	**	Prof. Paul Weihe and family, Central College, Pella, IA/grad students	7
6/6/02	*	OSU-Its History and Its World--students/faculty	20
6/7/02	*	Senator DeWine Staffer, Lynne Crow w/ Dick Stoddard	2
6/10/02	*	Marie Cribley-Horsley, Bob Horsley, Seattle WA	3
6/12/02	**	F. Sherwood Roland (Nobel Prize laureate) and wife Joan, U. Cal-Irvine	5
6/15/02	*	Michelle Guthrie family	3
6/16/02	**	University of Oklahoma, Prof. Bob Nairn and students	8
6/18/02	*	13 high school teachers (+ Marilyn Trefz)	14
6/19/02	*	Battelle Institute - Adam Wagenbach, Janice Fry	2
6/21/02	*	Shawnee State University - Upward Bound Students	51
6/21/02	*	Randy Edwards-Ohio Board of Regents	1
6/21/02	**	Dwight Shellman, Cato Lake Foundation	1
6/28/02		YSI Inc., Yellow Springs, OH	6
7/8/02	*	Lisa Everman - Lantern	1
7/8/02	*	EE0B 210 - Local Flora	27
7/16/02	*	Elizabeth Hernandez	1
7/18/02	*	Trish Raridan-Preston and students from Admissions	26
7/18/02	*	Tim van Echo, BBC&M	2

7/19/02	*	Doug Peabody	1
7/21/02	*	St. Stephens Episcopal Church	20
7/24/02	*	Trish Raridan-Preston and students from Admissions	25
7/24/02	*	Quinton Williamson, Richmond, IN	41
7/26/02	*	City Planners, New York City	3
7/26/02	*	Scotts--Denny Hall, Chris Schmenk, Paula Bodi	4
7/29/02	*	Matt Feeman - Apple	1
7/31/02	*	Jennifer Cox-Methodist Church group	17
8/2/02	*	Kim Whaley, COSI	3
8/5/02	*	Maria Conroy, City & Regional Planning, 12 German Students, 4 Fac	16
8/6/02	*	Ted Hattemer, Univ. Relations	1
8/7/02	*	Visiting USSR Profs.	5
8/7/02	*	Jennifer Cox and Children's Home	18
8/8/02	*	Martin Essex School for Gifted	50
8/12/02	**	Ed Herricks, University of Illinois and short course class	15
8/12/02	*	Moonlight on the Marsh seminar	80
8/15/02	*	Charla Starker, 10 students	11
8/15/02	*	Bill Heffner lunch and tour	10
8/16/02	*	Mary Ann Abiado, Dr. Nancy Gitanga of Kenya	2
8/22/02	*	Columbus State	20
8/23/02	*	Congressional Staffers, Gwen Wolford	30
8/23/02	*	Dean & College	5
8/23/02	*	Neal Foote	2
9/17/02	*	Bob Brown	1
9/17/02	**	Prof. Doug Spieles, Denison Univ.	20
9/18/02	*	Andrea, Olentangy Village Apt	3
9/19/02	*	Tom Wiebel and Bob Singleton	2
9/23/02	*	Bobbi Fisher and Jim Lane, jr.	3
9/23/02	*	Ken Kulka	1
9/24/02	*	Mitch Strain and Orville people	5
9/24/02	*	FLOW-Honeysuckle removal project in bottomland forest-0OSU volunteers	30
9/24/02	*	Capital University	17
9/29/02	*	FLOW-Honeysuckly removal	10
9/29/02	*	Gerlach family	10
10/3/02	*	Cassie Winkle, Gen Biology Class	15
10/8/02	*	OARDC Branch Review Committee	10
10/8/02	*	Deal, Wolfe, Tuovinen	3
10/11/02	*	N. Central Chapter, SWS	25
10/11/02	*	Hard hat event, development office	40
10/14/02	*	Cub Scouts, Lisa Martinez	10
10/15/02	*	Scotland students, Cindy Plummer- Development	15
10/19/02	*	Ann Altor, potential grad student	1
10/23/02	**	Andy Baldwin, University of Maryland	3
10/24/02	*	Hard hat event	20
11/4/02	*	Zande and Asociates, Inc.	3
11/4/02	*	Ben Winner	7
11/5/02	*	Chris Kauffman, ODNR CREP study	2
11/7/02	*	Ohio Watershed Network	15
11/9/02	*	Junior High	8
11/16/02	*	SNR Mock lecture and tour of ORW by parents	20
11/21/02	*	Stephanie Lipe, potential grad student	1
11/21/02	*	David Mysold, Oregon State	1
11/22/02	**	General Van Winkle, U.S. Army Corps of Engineers	3
11/22/02	**	John W. Day, Louisiana State University	1
11/22/02	*	Louisiana and Mississippi River Basin Restoration Conference	50
11/25/02	*	David Benfield	1
12/12/02	*	Ed Quinkert, Fort Hayes High School	25
12/28/02	**	Doreen Vetter, U.S. Environmental Protection Agency, Washington DC	5
		TOTAL	1644
		# of Tours/Presentations	118

*site tour

**site tour with visiting scientist or distinguished visitor

Figure 7. Gerlach family during their tour of the Olentangy River Wetland Research Park, September 29, 2002

Figure 8. Nobel prize winner Sherwood Roland, University of California Irvine, and his wife Joan toured the Olentangy River Wetlands, June 12, 2002

Table 5. Publications of the Olentangy River Wetland Research Park in 2002

Papers

02-005 Mitsch, W.J., J.C. Lefeuvre, and V. Bouchard. 2002. Ecological engineering applied to river and wetland restoration. *Ecological Engineering*. 18: 529-541.

02-004 Anderson, K.L., K.A. Wheeler, J.A. Robinson, and O. H. Tuovinen. 2002. Atrazine mineralizaation potential in two wetlands. *Water Research* 36:4785-4794.

02-003 Mitsch, W.J. 2002. Ecological engineering. *Environmental Engineering Magazine* 38: (2) 27-33.

02-002 Ahn, C. and W.J. Mitsch. 2002. Evaluating the use of recycled coal combustion products in constructed wetlands: An ecologic-economic modeling approach. *Ecological Modelling* 150: 117-140.

02-001 Ahn, C. and W.J. Mitsch. 2002. Scaling considerations of mesocosm wetlands in simulating large created freshwater marshes. *Ecological Engineering* 18: 327-342.

Theses/Dissertations

Cheri Higgins. 2002. "Ecosystem engineering by muskrats (*Ondatra zibethicus*) in created freshwater marshes" Master's thesis, Environmental Science Graduate Program, The Ohio State University.

Amie M. Gifford. 2002. "The effect of macrophyte planting on amphibian and fish community use of two created wetland ecosystems in central Ohio" Master's thesis, Environmental Science Graduate Program, The Ohio State University.

Technical Reports

T-02-02 Mitsch, W.J. and L. Zhang, eds. 2002. Olentangy River Wetland Research Park at The Ohio State University, Annual Report 2001, School of Natural Resources, The Ohio State University, 141 pp.

T-02-01 Mitsch, W.J., L. Zhang, and D. Fink. 2002. Pre-restoration studies of water quality in the Upper Big Darby watershed—First-year report. Report to U.S. Army Corps of Engineers, Huntington District, Olentangy River Wetland Research Park, School of Natural Resources, The Ohio State University, Columbus.

Table 6. Press and media coverage of the Olentangy River Wetland Research Park, 2002

Date	Article Title or Event	Publication
June 6, 2002	"Wetlands park near completion"	The Lantern
July 18, 2002	"More than just Water-wetlands popular teaching tool for university students"	The Lantern
Summer 2002	"Funding the Future"	The Ohio State University Development Office
July 18, 2002	"Field study" photo of ORW students	The Columbus Dispatch
June 25, 2002	"Sulak alanlar; böbreklerimiz!" "Wetlands: Nature's kidney!" (in Turkish)	Dosya (Turkash Magazine)
December 28, 2002	"U.S. to revamp wetlands policy"	The Columbus Dispatch

Figure 9. River restoration short course participants at the Olentangy River dam being discussed for removal.

Table 7. Donation support for the Olentangy River Wetland Research Park through 2002.

Year	Number of donations	Total amount of donations	In-kind donations*	Endowment donations	General cash donations**	Building fund
2002	263	$365,031	$80,510	$ 445	$166,199	$117,957
2001	319	$248,416	$75,000	$1,140	$9,984	$162,292
2000	250	$237,077	$31,300	$97,620	$22,129	$86,028
1999	165	$115,626	$3,705	$94,000	$6,782	$11,138
1998	149	$98,839	$23,624	$4,415	$63,360	$7439
1997	168	$78,228	$13,503	$300	$61,215	$3,213
1996	146	$221,889	$187,78	$4,000	$30,105	
1995	108	$97,184	$36,516	$11,000	$49,668	
1994	86	$62,686	$48,744		$13,942	
1993	46	$259,206	$21,215		$237,991	
1992	7	$59,347	$6,327		$53,020	
TOTAL	1708	$1,843,527	$521,577	$212,920	$720,965	$388,066

* In-kind includes construction of 7-acre billabong in 1996 ($170,000), donation of 5 acres of bottomland forest in 2001 ($75,000), and earthwork and gravel for building construction (2002)
** Includes construction of wetlands in 1992-95 ($330,000) and Sandefur Wetland Pavilion in 1997-98 ($100,000)

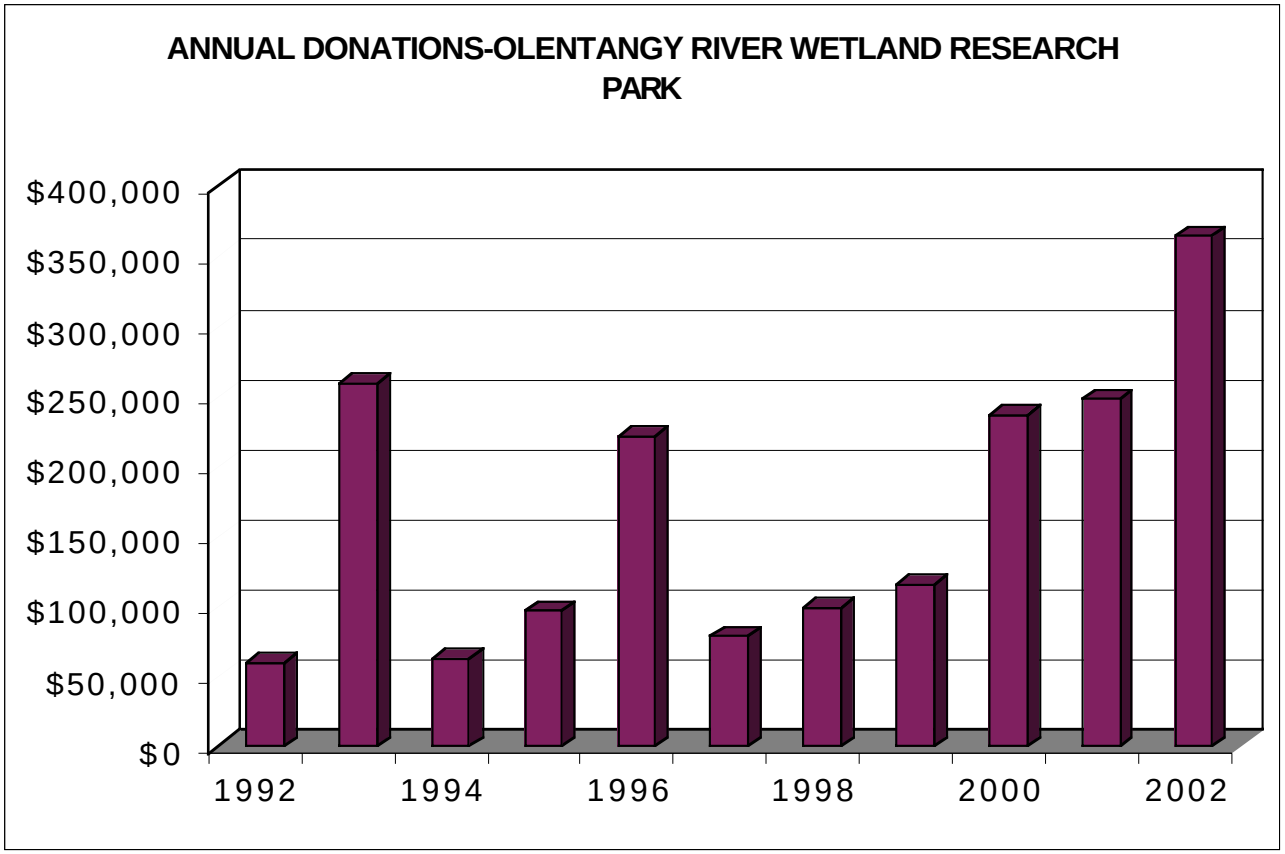

Figure 10. Total development support for Olentangy River Wetland Research Park, 1992-2002

researchers to take full advantage of the campus wetlands and relieves overcrowded labs, offices, and research facilities on campus. It includes a state-of-the-art control room, or "operations theater," where physical, chemical, and biological data in the wetland can be monitored in real time by staff wetland scientists. Some of those data are displayed in the adjacent lobby (Figure 12) designed as a starting point for wetland site tours. The building also includes a conference center for continuing education-type courses of wetlands that, up to this point, have been taught in local hotels that charged meeting room fees. The building will also include faculty and student offices, wet-laboratories for water analysis, a soil-water-plant analysis prep room (mud room), and a wetland library.

The cost of the building after bids was determined to be approximately $2.5 million. By the end of 2002, most of the money had been raised for the building, including grants from the Ohio Board of Regents, development funds, and support from OARDC. A $330,000 loan from OARDC allowed the entire building to be constructed and that loan needs to be paid back.

The Master Plan

Substantial progress has been made on the Olentangy River Wetland Research Park for the past decade. Phase 2 was completed in 1999 and Phase 3, the last phase of site construction shown in the site master plan (Figure 13), called for construction of a wetland research and education building. Construction began on the building in April 2002 and the building structure was essentially completed by the end of 2002. Occupancy was March 3, 2003. Additional bike paths and interpretative signs are planned for 2003.

Wetland Endowment

In addition to capital costs, the building, the ecosystems, and site infrastructure, the ORWRP will require continued operational expenses. A goal of $1.5 million was established for an endowment to maintain this campus wetland area in perpetuity. One endowment account is for building support. The other account, provided by the Heffner family, includes support for the undergraduate site engineer who maintains the ORWRP site.

ORWRP's 12-Year Impact at OSU

Through 2002, the economic and academic impact of the ORWRP on Ohio State University and the world of wetland science has been significant. Over its 10-year period of development and operation, the ORWRP has resulted in the following economic advantages to the University:

Wetland Short Courses	$110,000
Extramural Grants and Contracts	$2,700,000
Donations	$1,850,000
Total impact	$4,660,000

Over the period 1992-2002, the project has also been responsible for the following academic achievements:

• completion of 40 undergraduate and graduate student theses and dissertations at OSU and in Europe,

• publication of 104 papers listed in the ORWRP reprint series,

• completion of 11 comprehensive annual reports of all research accomplished at the site,

• leadership of over 820 formal wetland tours and presentations for the public to an estimated 20,000 individuals including K-12 students, university students, garden clubs, campus visitors, and Federal, state, and local public officials.

• provision of a convenient set of campus ecosystems in support of an estimated 135 Ohio State University classes in 5 university colleges.

• provision of a controlled research site for dozens of students doing independent research. This has supported the research programs of more than 20 OSU professors.

• education of 174 agency personnel and consultants in 12 wetland short courses taught since 1996.

References

Mitsch, W.J., J. W. Day, Jr., J. W. Gilliam, P. M. Groffman, D. L. Hey, G. W. Randall, and N. Wang. 2001. Reducing nitrogen loading to the Gulf of Mexico from the Mississippi River Basin: Strategies to counter a persistent large-scale ecological problem. BioScience 51: 373-388.

National Research Council. 2001. Compensating for Wetland Losses under the Clean Water Act. National Academy Press, Washington, DC, 322 pp.

Figure 11. Wetland Research and Education Building nears completion, December 2002

Figure 12. Wetland building lobby and developing YSI data control center wall, April 8, 2003

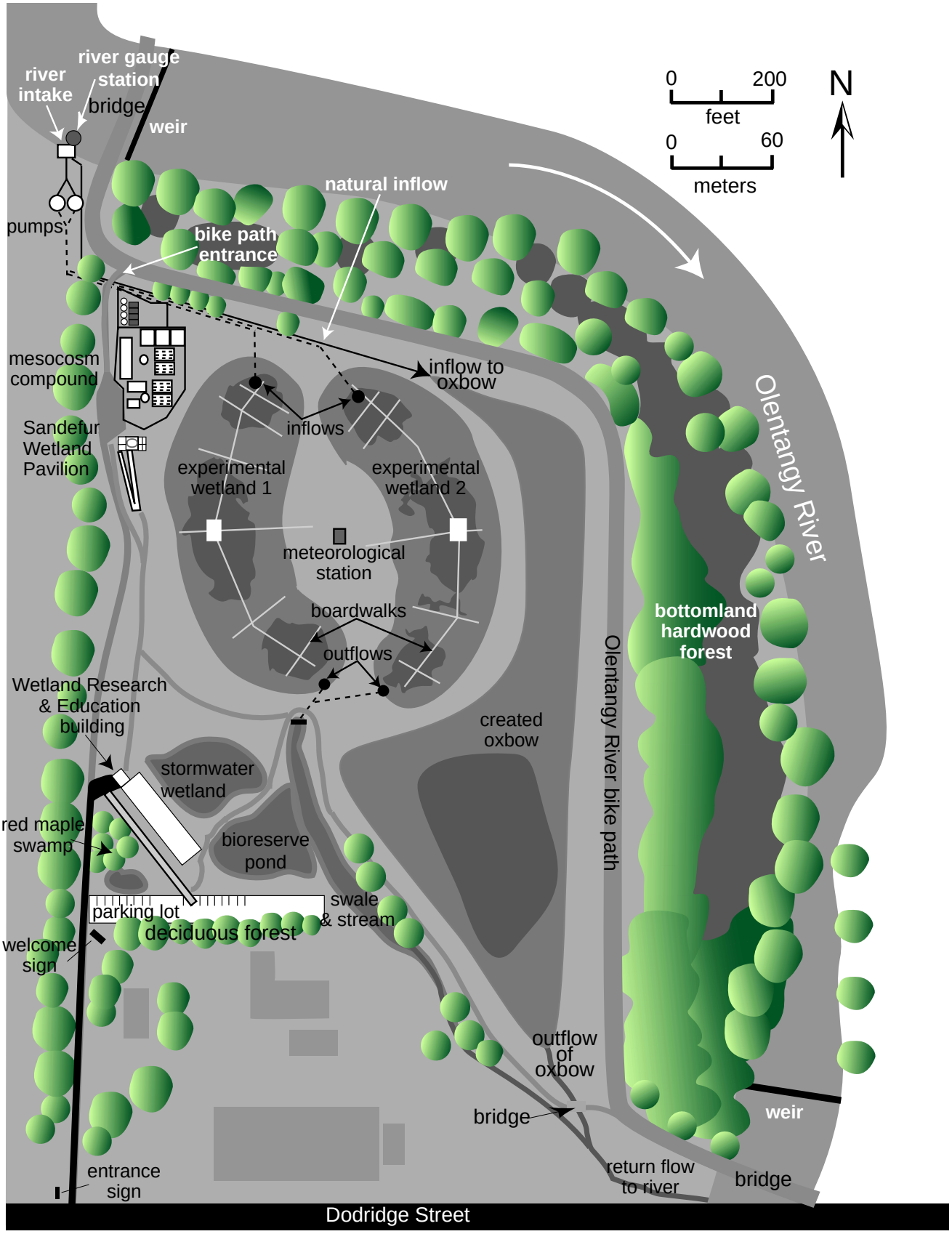

Figure 13. Master plan for the Olentangy River Wetland Research Park.